

REMARKS

Introduction

Claims 1-4, 9, 10, 12-16, 18-20, 22, and 25-27 are pending in the present application. Applicant has canceled claims 6-8, 11, 17, 21, 23, and 24 above without disclaimer or prejudice to their reintroduction in this application or in a future continuation or divisional application.

The amendments to claim 1 are supported in the original disclosure at, for example, page 4, lines 3-4, and page 11, lines 1-6.

The amendments to claim 9 are supported in the original disclosure at, for example, page 10, line 7.

The amendments to claims 12-14 are supported in the original disclosure at, for example, page 7, lines 1-16.

The amendments to claim 15 are supported in the original disclosure at, for example, page 10, lines 15-17.

The amendments to claim 16 are supported in the original disclosure at, for example, page 4, lines 3-4, page 5, lines 20-21, page 10, lines 15-17, page 11, lines 11-14.

The amendments to claim 22 are supported in the original disclosure at page 4, lines 3-4, and page 9, lines 15 and 22-32.

The subject matter of new claim 25 is supported in the original disclosure at, for example, page 13, lines 16-18.

The subject matter of new claim 26 is supported in the original disclosure at, for example, page 7, lines 1-6.

The subject matter of new claim 27 is supported in the original disclosure at, for example, page 8, lines 15-16.

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Other amendments to the claims have been presented to remove reference numerals and address grammatical or other non-substantive matters.

Applicant respectfully requests approval and entry of the above claim amendments and new claims 25-27.

Specification

Applicant has amended claim 22 above to delete the feature allegedly lacking antecedent basis in the specification. Hence, Applicant respectfully submits that the objection has been rendered moot, and respectfully requests its withdrawal.

Drawings

Applicant has filed a replacement drawing of Figure 1, omitting reference numeral 97 and its lead line.

Claim 22 has been amended to delete the features allegedly not shown in the drawings. Accordingly, Applicant respectfully submits that this rejection has been rendered moot, and respectfully requests withdrawal of the objection.

Claim Rejections -- 35 U.S.C. § 112

Applicant respectfully submits that the Examiner's rejection of claim 22 has been rendered moot by the foregoing amendments, which remove the objected features from the claims. Accordingly, Applicant respectfully requests withdrawal of the rejection.

Claim Objections

Applicant respectfully submits that the Examiner's objection of claim 22 has been rendered moot by the foregoing amendments, which remove the objected features from the claims. Accordingly, Applicant respectfully requests withdrawal of the objection.

Claim Rejections -- 35 U.S.C. § 103

1. Claims 1, 2, 10, and 19

Claims 1, 2, 10 and 19 have been rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over U.S. Patent No. 6,661,658 to Capriz et al. Applicant respectfully traverses the rejection for at least the following reasons.

To better understand the differences between the present invention and the applied art, Applicant will briefly describe the invention as claimed in claim 1. Claim 1 recites a device for cooling power electronics. The device features a support plate on which power electronics are mounted, a pressed metal plate including press-formed liquid circulation channels for cooling the power electronics, an intermediate plate sandwiched between the support plate and pressed metal plate, and at least one manifold. The manifold is fixed to the intermediate plate, connected to the cooling circuit, and introduced in an orifice of the support plate.

Capriz discloses a fluid cooled heat sink 1 having a thick metal first plate 2 and a second plate 6. (Figure 3 and column 3, lines 4-22). Unlike the present invention, Capriz does not disclose or reasonably suggest an intermediate plate sandwiched between the thick metal first plate 2 and the second plate 6. Capriz also fails to disclose or reasonably suggest at least one manifold fixed to an intermediate plate or introduced in an orifice of the support plate.

For these reasons, Applicant respectfully requests reconsideration and withdrawal of the Section 103(a) rejection of claims 1, 2, 10, and 19.

2. Claim 3

Claim 3 has been rejected under 35 U.S.C. § 103(a) as being unpatentable over Capriz in view of U.S. Patent No. 6,648,062 to Fukazu et al. The Examiner relies on Fukazu to overcome the failure of Capriz to disclose deflectors for guiding coolant flow.

Applicant respectfully traverses this rejection. Claim 3 depends from claim 1 and incorporates its distinguishing features. As explained above in reference to claim 1, Capriz fails to teach an intermediate plate sandwiched between a support plate and pressed metal plate, and at least one manifold fixed to the intermediate plate and introduced through an orifice of the support plate. Fukazu does not overcome the deficiencies of Capriz. Fukazu discloses at column 3, lines 40-42 that its power control unit 2 is comprised of heat sink 5 having passage 6 and various devices placed thereon. Figure 4 is a cross-section of heat sink 5, showing a top wall 24 of heat sink 5, with fins 22 extending between bottom surface 25 and the top wall 24 of the heat sink. Fukazu does not disclose or suggest an intermediate plate sandwiched between a support plate and pressed metal plate. Further, Fukazu does not appear to disclose at least one manifold introduced through an orifice of a support plate. Applicant notes that inlet 14 and outlet 15 of Fukazu are openings formed in the sidewall of the power control unit.

For these reasons, Applicant respectfully requests reconsideration and withdrawal of the Section 103(a) rejection of claim 3.

3. Claim 4

Claim 4 has been rejected under 35 U.S.C. § 103(a) as being unpatentable over Capriz in view of U.S. Patent No. 7,068,507 to Pfeifer al. Applicant respectfully traverses this rejection.

plates, Pikovsky does not teach a manifold fixed to the intermediate plate and introduced in the orifice of the support plate. (See Figure 1 of Pikovsky)

For these reasons, Applicant respectfully requests reconsideration and withdrawal of the Section 103(a) rejection of claims 6-8.

5. *Claims 9, 12, 15, and 23*

Claims 9, 12 15, and 23 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Capriz in view of U.S. Patent No. 6,662,859 to Strähle et al.

The rejection of claim 23 is rendered moot by the cancellation of claim 23.

Applicant respectfully traverses the rejection of claims 9, 12, and 15, which depend from claim 1 and incorporate its distinguishing features. As explained above in reference to claim 1, Capriz fails to teach an intermediate plate sandwiched between a support plate and pressed metal plate, and at least one manifold fixed to the intermediate plate and introduced through an orifice of a support plate. Applicant respectfully submits that Strähle does not overcome the deficiencies of Capriz. Like Capriz, Strähle fails to disclose an intermediate plate sandwiched between a support plate and pressed metal plate. Strähle also fails to disclose at least one manifold fixed to an intermediate plate. Applicant also points out that Strähle does not disclose a pressed metal plate having press-formed circulation channels.

For these reasons, Applicant respectfully requests reconsideration and withdrawal of the Section 103(a) rejection of claims 9, 12, 15, and 23.

6. *Claims 16 and 17*

Claims 16 and 17 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Capriz in view of Pikovsky, and in further view of Strähle.

Applicant respectfully submits that the rejection of claim 17 has been rendered moot by its cancellation. Applicant respectfully traverses the rejection of claim 16.

Claim 4 depends from claim 1 and incorporates its distinguishing features. As explained above in reference to claim 1, Capriz fails to teach an intermediate plate sandwiched between a support plate and pressed metal plate, and fails to suggest at least one manifold fixed to an intermediate plate or introduced through an orifice of a support plate. Pfeifer does not overcome the deficiencies of Capriz. Pfeifer does not disclose or suggest an intermediate plate sandwiched between a support plate and pressed metal plate. Further, Pfeifer does not appear to disclose at least one manifold fixed to an intermediate plate and introduced through an orifice of a support plate.

For these reasons, Applicant respectfully requests reconsideration and withdrawal of the Section 103(a) rejection of claim 4.

4. *Claims 6-8*

Claims 6-8 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Capriz in view of U.S. Patent Application Publication No. 2003/0178182 to Pikovsky et al.

Applicant respectfully submits that this rejection has been rendered moot by the cancellation of claims 6-8. In the event that the Examiner believes that the rejection might apply to amended claim 1 or any of its dependent claims, Applicant respectfully traverses this rejection.

As explained above in reference to claim 1, Capriz fails to teach at least one manifold fixed to a plate or an intermediate plate sandwiched between a support plate and pressed metal plate. Pikovsky does not overcome the deficiencies of Capriz. Pikovsky illustrates in Figure 1 and describes at paragraph 0016 a circuit board cooling system including a liquid circulation channel 102 stamped in a first plate 104 and a second plate 106 as a cover. Pikovsky does not disclose or suggest an intermediate plate sandwiched between a support plate and pressed metal plate. Although, as pointed out by the Examiner, Pikovsky discloses small holes in its

Claim 16 is directed to a method of manufacturing a power electronics cooling device, in which a manifold is brazed on an intermediate plate, and a support plate on which power electronics are mounted is mounted on the intermediate plate such that the manifold on the intermediate plate is introduced in an orifice of the support plate. Additionally, a metal plate is pressed into a cooling circuit, and the intermediate plate is mounted on the pressed metal plate such that the manifold connects to the cooling circuit.

Capriz fails to teach a step of brazing a manifold on an intermediate plate. Further, Capriz fails to teach a step of mounting a support plate on an intermediate plate such that the manifold on the intermediate plate is introduced in an orifice of the support plate. Still further, Capriz fails to teach a step of mounting the intermediate plate on a pressed metal plate such that the manifold is connected to the cooling circuit.

Pikovsky does not overcome the deficiencies of Capriz. Pikovsky illustrates in Figure 1 and describes at paragraph 0016 a circuit board cooling system including a liquid circulation channel 102 stamped in a first plate 104 and a second plate 106 as a cover. Pikovsky does not disclose or suggest brazing a manifold on an intermediate plate, mounting a support plate on an intermediate plate such that the manifold on the intermediate plate is introduced in an orifice of the support plate, and mounting an intermediate plate on a pressed metal plate such that the manifold is connected to the cooling circuit.

Like Capriz and Pikovsky, Strähle fails to disclose brazing a manifold on an intermediate plate, mounting a support plate on the intermediate plate such that the manifold on the intermediate plate is introduced in an orifice of the support plate, and mounting the intermediate plate on a pressed metal plate such that the manifold is connected to the cooling circuit. Applicant also points out that Strähle does not disclose a pressed metal plate having press-formed circulation channels.

For these reasons, Applicant respectfully requests reconsideration and withdrawal of the Section 103(a) rejection of claims 16 and 17.

7. Claim 11

Claim 11 has been rejected under 35 U.S.C. § 103(a) as being unpatentable over Capriz in view of Pikovsky, and further in view of U.S. Patent No. 2,821,014 to Miller. The Examiner relies on Miller to overcome the failure of Capriz and Pikovsky to disclose plating.

This rejection has been rendered moot by the cancellation of claim 11. In the event that the Examiner might believe that the rejection applies to new claim 1, the rejection is respectfully traversed.

Claim 11 depended from claim 1 and incorporated its distinguishing features. As explained above in reference to claim 1, Capriz fails to teach an intermediate plate sandwiched between a support plate and pressed metal plate, and at least one manifold fixed to the intermediate plate and introduced through an orifice of a support plate. Applicant respectfully submits that Pikovsky and Miller, when taken alone or in combination, do not overcome the deficiencies of Capriz.

As discussed above, Pikovsky illustrates in Figure 1 and describes at paragraph 0016 a circuit board cooling system including a liquid circulation channel 102 stamped in a first plate 104 and a second plate 106 as a cover. No mention is made of sandwiching an intermediate plate between the first plate 104 and second plate 106. Although Pikovsky discloses small holes in its plates, Pikovsky does not teach a manifold fixed to the intermediate plate and introduced in the orifice of the support plate. (See Figure 1 of Pikovsky)

Miller has been cited for its alleged disclosure of plating. Applicant respectfully submits that Miller does not relate to cooling devices for power electronics, and does not disclose the claimed structure of Applicant's cooling devices.

For these reasons, Applicant respectfully requests reconsideration and withdrawal of the Section 103(a) rejection of claim 11.

8. *Claims 13 and 14*

Claims 13 and 14 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Capriz in view of Strähle, and further in view of Miller.

Claims 13 and 14 each indirectly direct from claim 1, and therefore incorporate all of the distinguishing features of claim 1. As explained above in reference to claim 1, Capriz fails to teach an intermediate plate sandwiched between a support plate and pressed metal plate, and at least one manifold fixed to the intermediate plate and introduced through an orifice of a support plate. Applicant respectfully submits that Strähle does not overcome the deficiencies of Capriz. Like Capriz, Strähle fails to disclose an intermediate plate sandwiched between a support plate and pressed metal plate. Strähle also fails to disclose at least one manifold fixed to an intermediate plate. Applicant also points out that Strähle does not disclose a pressed metal plate having press-formed circulation channels.

Miller has been cited for its alleged disclosure of plating. Applicant respectfully submits that Miller does not relate to cooling devices for power electronics, and does not disclose the claimed structure of Applicant's cooling devices.

For these reasons, Applicant respectfully requests reconsideration and withdrawal of the Section 103(a) rejection of claims 13 and 14.

9. *Claim 18*

Claim 18 has been rejected under 35 U.S.C. § 103(a) as being unpatentable over Capriz in view of Pikovsky, further in view of Strähle, and further in view of Pfeifer.

Claim 18 depends from claim 16, and therefore incorporates all of the distinguishing features of claim 18. As discussed above in connection with claim 16, Capriz, Pikovsky, and Strähle, when taken alone or in combination with one another, fail to teach the claimed cooling device. Pfeifer, which has been cited for its alleged disclosure of deflectors and

turbulators, does not overcome the deficiencies of Capriz, Pikovsky, and Strähle. Pfeifer does not disclose or reasonably suggest brazing a manifold on an intermediate plate, mounting a support plate on the intermediate plate such that the manifold on the intermediate plate is introduced in an orifice of the support plate, and mounting the intermediate plate on a pressed metal plate such that the manifold is connected to the cooling circuit.

For these reasons, Applicant respectfully requests reconsideration and withdrawal of the Section 103(a) rejection of claim 18.

10. Claim 20

Claim 20 has been rejected under 35 U.S.C. § 103(a) as being unpatentable over Capriz in view of Fukazu, and further in view of Pfeifer

Claim 20 depends indirectly from claim 1, and therefore incorporates all of the distinguishing features of claim 1. As explained above in reference to claims 1 and 3, Capriz fails to teach an intermediate plate sandwiched between a support plate and pressed metal plate, and at least one manifold fixed to the intermediate plate and introduced through an orifice of the support plate. Fukazu does not overcome the deficiencies of Capriz. Fukazu discloses at column 3, lines 40-42 that its power control unit 2 is comprised of heat sink 5 having passage 6 and various devices placed thereon. Figure 4 is a cross-section of heat sink 5, showing a top wall 24 of heat sink 5, with fins 22 extending between bottom surface 25 and the top wall 24 of the heat sink. Fukazu does not disclose or suggest an intermediate plate sandwiched between a support plate and pressed metal plate. Further, Fukazu does not appear to disclose at least one manifold introduced through an orifice of a support plate. Rather, inlet 14 and outlet 15 of Fukazu are openings formed in the sidewall of the power control unit.

Pfeifer, which has been cited for its alleged disclosure of deflectors and turbulators, does not overcome the deficiencies of Capriz and Fukazu. Pfeifer does not disclose or reasonably suggest fixing a manifold on an intermediate plate, sandwiching the intermediate

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plate between a support plate and a pressed metal plate such that the manifold on the intermediate plate is introduced in an orifice of the support plate and connected to the cooling circuit.

For these reasons, Applicant respectfully requests reconsideration and withdrawal of the Section 103(a) rejection of claim 20.

11. Claim 21

Claim 21 has been rejected under 35 U.S.C. § 103(a) as being unpatentable over Capriz in view of Miller.

The rejection of claim 21 has been rendered moot by the cancellation of claim 21. Accordingly, withdrawal of this rejection is believed in order.

12. Claim 24

Claim 24 has been rejected under 35 U.S.C. § 103(a) as being unpatentable over Capriz in view of Pfeifer, and further in view of Pikovsky.

The rejection of claim 24 has been rendered moot by the cancellation of claim 24. Accordingly, withdrawal of this rejection is believed in order.

Conclusion

It is respectfully submitted that a full and complete response has been made to the outstanding Office Action and, as such, there being no other objections or rejections, this application is in condition for allowance, and a notice to this effect is earnestly solicited.

If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at the number provided below.

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If any further fees are required in connection with the filing of this amendment, please charge the same to out Deposit Account debit Account 50-0548.

Respectfully submitted,



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